Homework Assignments
MAT 104

The daily homework assignments will be selected from these, with possible additions.

Always show your work. You are encouraged to work together on homework. (First do the problems independently, then compare and discuss.) Please **staple your papers**, write clearly in sentences, and circle your answers. Read the instructions for each problem. Sometimes they occur before a group of problems, even on the preceding page.

1. §**8.1, p. 542:** 3, 7, 18, 57 (tricky!). §**8.2, p. 552:** 5, 8, 42, Find the following: A. $\int (\ln x)^3\,dx$, B. $\int (x^2+1)^{23}x\,dx$, C. $\int xe^x\,dx$, D. $\int \frac{\sqrt{x}}{1+x^{3/2}}\,dx$, E. $\int x\cos x\,dx$, F. $\int \frac{dx}{\sqrt{x}+3}$.

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2. §**8.3, p. 563:** 1, 9, 14, 29, 35, Find the following: A. $\int \frac{x+3}{x^2+2x+5}dx$, B. $\int \frac{x+1}{x(x^2+3)}dx$, C. $\int \frac{x^2-3x-10}{x^3+2x^2+5x}\,dx$, D. $\int \frac{x+1}{(x-1)(x^2-2x-3)}\,dx$.

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3. §**8.4, p. 569:** 3, 17 (careful! the answer is not 0), 23, §**8.5, p. 575:** 6, 15, 18, Find the following: A. $\int \frac{1}{x^2\sqrt{x^2-9}}\,dx$, B. $\int \ln(x^2+1)\,dx$, C. $\int \frac{dx}{x^2\sqrt{1+x^2}}$, D. $\int \frac{dx}{x\sqrt{1+(\ln x)^2}}$.

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4. §**8.8, p. 615:** 1, 2, 8, 41, 43, 47, 51, 65b, §**11.1, p. 741:** 2, 20, 27, A. Does $\int_0^\infty \frac{dx}{\sqrt{x}+x^2}$ converge or diverge? Why? B. Does $\int_1^\infty \frac{dx}{x^2+\sin^2(x)}$ converge or diverge? Why? C. Does $\int_1^\infty \frac{\sqrt[3]{x^2+2}}{\sqrt{x^3+3}}\,dx$ converge or diverge? Why? D. Find $\lim_{n\to\infty}(173n^3)^{1/n}$ and give your reasons.

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5. §**11.2, p. 753:** 7, 8, 23, 26, §**11.3, p. 759:** 1, 6, §**11.4, p. 765:** 4, 6, §**11.5, p. 770:** 19, 21, 22, For the following two series, state whether they converge or diverge and give your reasons: A. $\sum_{n=0}^{\infty}\frac{\sqrt[3]{n^2+2}}{\sqrt{n^3+3}}$, B. $\sum_{n=2}^{\infty}\frac{1}{n(\ln n)^2}$ (use the integral test).

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6. §**11.6, p. 776:** 2, 4, 13, 18, For the following three series, state whether they converge or diverge and give your reasons: A. $\sum_{n=1}^{\infty}(-1)^n\left(2+\frac{3}{\sqrt{n^3+5}}\right)$, B. $\sum_{n=2}^{\infty}(-1)^{n+1}\frac{1}{\ln n\sqrt{n+5}}$, C. $\sum_{n=1}^{\infty}\frac{\sin e^n}{n^2}$.

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7. §**11.7, p. 788:** 1, 2, 12, 24, 30, 41, A. For what values of x does $\displaystyle\sum_{n=1}^{\infty} \frac{(x-2)^n}{2^n n^2}$ converge? Give your reasons. B. For what values of x does $\displaystyle\sum_{n=1}^{\infty} \frac{(x-2)^n}{\sqrt{n}}$ converge? Give your reasons. C. Let $f(x) = \displaystyle\sum_{n=2}^{\infty} \frac{x^n}{\ln n \sqrt{e^n}}$. Find a power series for $\displaystyle\int f(x)\,dx$.

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8. §**11.8, p. 794:** 3, 6, 17, 25, 26 (do it the easy way), §**11.9, p. 803:** 1, 12, 19, 22 (hint: this is a Taylor polynomial estimate), §**11.10, p. 815:** 41, 44, 47, 55 A. Find $\displaystyle\lim_{x\to 0} \frac{(\sin x - x)^3}{x^9}$ and simplify your answer. B. Find $1/e$ with an error less than $1/10!$. (Do not simplify your answer.) C. Suppose you approximate $f(8)$ by the second degree Taylor polynomial for f at 10, and suppose you know that the third derivative of f is less than 3 in absolute value. Estimate the error in the approximation.

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9. §**10.5, p. 702:** 6abfh, 7, 10, 23, 53, **p. AP-21:** 3, 5, 6 (remember that $|z-w|$ is the distance from z to w), 8, 12, 13, 16, 19, A. Find the two square roots of $-i$ in Cartesian form. B. Let $z = e^{2+i\frac{\pi}{4}}$. Find $|z|$, Re z, Im z, and find $\bar{z}$ in Cartesian form. C. Let $z = 3 - 3i$. Find the following: $\bar{z}$, $|z|$, and the polar form ($re^{i\theta}$) of z. D. Find $(2+2i)^8$ in Cartesian form (that is, as $x+iy$ with x and y real). E. Find all solutions of $z^4 + 81 = 0$ in Cartesian form.

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10. **p. AP-61:** 1, 2, 3, 8, **p. AP-65:** 1, 2, 4, 5, 10, A. Find all functions y such that $e^y dx = (4+x^2)dy$. B. Find all functions y such that $\dfrac{dy}{dx} + \dfrac{8x^3}{x^4+1}y = \dfrac{1}{x}$.

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11. **p. AP-73:** 2, 3, 5, 6, 8, **p. AP-75:** 4, 6, 9, 10 **p. AP-81:** 3ab, A. Find all functions y such that $\dfrac{d^2y}{dx^2} - 4\dfrac{dy}{dx} + 13y = 0$, B. Find all functions y such that $\dfrac{d^2y}{dx^2} - 4\dfrac{dy}{dx} + 13y = x + 3$.

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12. §**6.1, p. 435:** 3, 10, 19, 42, 55, §**6.2, p. 443:** 1, 4, 28, §**6.3, p. 452:** 9, 10, §**6.5, p. 474:** 13, 14, §**8.1, p. 544:** 91, §**8.2, p. 553:** 36.

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