

Final Exam Practice Answers:

Sequences & Series

- 1) a. $\frac{x^2 \ln(x)}{2} - \frac{x^2}{4} + c$ b. $(x+1)^2 e^{x+1} - 2(x+1)e^{x+1} + 2e^{x+1} + c$ c. $\frac{(2x+3)}{2} \arctan(2x+3) - \frac{\ln(1+(2x+3)^2)}{4} + c$
- 2) a. $\frac{1}{1 - \frac{2012}{2013}} = 2013$ geometric
b. diverges by divergence theorem
c. $\frac{4^5}{6^7} \left(\frac{1}{1-4/6}\right) = \frac{32}{729}$ geometric
d. 1 (telescoping)
- 3) a. diverges by integral test
b. diverges by divergence theorem
c. converges alternating series test
d. converges root test, $(1 - \frac{1}{2n})^n \rightarrow e^{-1/2}$
e. converges comparison test compare to $\frac{1}{n^2}$
f. diverges comparison test
- 4) radius = 4
interval $(-2, 6]$
- 5) $\sum_{n=1}^{\infty} nx^n$ (take derivative of geometric, multiply by x)

Multivariable

- 1) $x = -2$ or $x = 4$
- 2) $\frac{7i+2j-k}{\sqrt{54}}$ and $\frac{-7i-2j+k}{\sqrt{54}}$ I am writing vectors in different ways to show there are multiple correct answers
- 3) a. $\langle 4, -3, 4 \rangle$ b. $\sqrt{41}/2$
- 4) a. $\langle 1+3t, 1-2t, 5-3t \rangle$ b. $\langle 1, 0, -1 \rangle + t \langle 2, -1, 5 \rangle$
- 5) a. $-5(x-2) + 6(y-1) + 8z = 0$ b. $-6(x-1) - 9(y-2) + (z+2) = 0$
- 6) $\frac{z}{27} (13^{3/2} - 8)$
- 7) $\langle 1/3, 1/2, 1 \rangle + t \langle 1, 1, 1 \rangle$
- 8) $z = x+1$
- 9) $(0, -2)$ is a local min.
- 10) min at $(2, 4)$, max at $(1, 2)$
 -64 4
- 11) height = 36, length = width = 18
- 12) $162/\sqrt{54}$

