

1. (2 points) Choose the correct partial fractions expansion for the function

$$f(x) = \frac{7x^3 - 5x^2 + 2x + 9}{(x-2)^2(x+1)(2x-3)(x^2+4)}.$$

- (a)  $\frac{A}{x-2} + \frac{B}{x-2} + \frac{C}{x+1} + \frac{D}{2x-3} + \frac{Ex+F}{x^2+4}$   
 (b)  $\frac{A}{x-2} + \frac{B}{(x-2)^2} + \frac{C}{x+1} + \frac{D}{2x-3} + \frac{E}{x^2+4}$   
 (c)  $\frac{A}{x-2} + \frac{B}{(x-2)^2} + \frac{C}{x+1} + \frac{D}{2x-3} + \frac{Ex+F}{x^2+4}$   
 (d)  $\frac{A}{x-2} + \frac{B}{(x-2)^2} + \frac{Cx+D}{x+1} + \frac{E}{2x-3} + \frac{F}{x^2+4}$   
 (e)  $\frac{Ax+B}{(x-2)^2} + \frac{C}{x+1} + \frac{D}{2x-3} + \frac{Ex+F}{x^2+4}$

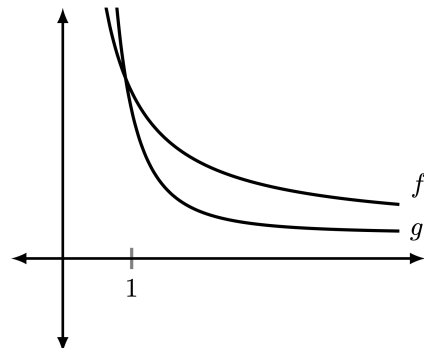
2. (2 points) Which of the following options is equal to the given integral?

$$\int \left( \frac{5}{2x+7} + \frac{8}{x^2+4} \right) dx$$

- (a)  $\frac{-10}{(2x+7)^2} - \frac{16x}{(x^2+4)^2} + C$   
 (b)  $\frac{5}{2} \ln|2x+7| + 4 \ln(x^2+4) + C$   
 (c)  $5 \ln|2x+7| + 8 \arcsin\left(\frac{x}{2}\right) + C$   
 (d)  $\frac{5}{2} \ln|2x+7| + 4 \arctan\left(\frac{x}{2}\right) + C$   
 (e)  $5(2x+7) + \frac{8}{x} \arctan(x) + C$

3. (2 points) Suppose the functions  $f$  and  $g$  below are continuous on  $(0, \infty)$  and  $f(x) > g(x) > 0$  for all  $x > 1$ . If you know that  $\int_1^{\infty} f(x) dx$  converges, what can you conclude about  $g$ ?

- (a)  $\int_1^{\infty} g(x) dx = 0$   
 (b)  $\int_1^{\infty} g(x) dx$  converges  
 (c)  $\int_1^{\infty} g(x) dx = \int_1^{\infty} f(x) dx$   
 (d)  $\int_1^{\infty} g(x) dx$  diverges  
 (e) You cannot conclude anything



4. (4 points) Evaluate the integral.

$$\int_0^1 \frac{2x^3}{(x^2 + 1)^3} dx$$