# FILL IN THE BLANK RING REVIEW

- The kernel of a ring homomorphism is a(n) ideal.
- The image of a ring homomorphism is a(n) subring.
- Use the candidates below to fill in the following:
  field $\implies$ Euclidean domain $\implies$ PID $\implies$ UFD $\implies$ domain.
  - domain
  - Euclidean domain
  - field
  - PID
  - UFD
- In a ring, unit $\implies$ not zerodivisor.
- A commutative ring has (exact) division by nonzero elements if it is a field.
- A[1] commutative ring has cancellation by nonzero elements if it is a domain.
- A commutative ring has division with remainder by nonzero elements if it is a Euclidean domain.
- In[2] a commutative ring, $(a) \subseteq (b) \iff b \mid a$.
- In[2] a commutative ring, $(a) = (b) \iff a \mid b$ and $b \mid a$.
- In[3] a domain, $(a) = (b) \iff$ associates.
- In[1] a UFD, GCDs exist.
- In[1] a PID, the GCD of two elements is a linear combination of them.
- In a domain, GCDs are unique up to associates.
- In[1] a commutative ring, maximal ideal $\implies$ prime ideal.
- In a PID, (nonzero) prime ideal $\implies$ maximal ideal.
- In a commutative ring $R$, $I$ is a maximal ideal $\iff R/I$ is a field.
- In a commutative ring $R$, $I$ is a prime ideal $\iff R/I$ is a domain.
- In a domain, prime element $\implies$ irreducible element.
- In[1] a UFD, irreducible element $\implies$ prime element.

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[1] Be sure to give the most general correct answer.
[2] Express in terms of divides.
[3] Express in terms of a word.